CLAIMS

1. (previously presented) A programmable device having programmable input/output (I/O) circuitry and programmable logic connected to receive incoming signals from and provide outgoing signals to the I/O circuitry, wherein:

the I/O circuitry can be programmed to function in an independent mode of operation in which first and second pads of the programmable device operate independent of one another; and

the I/O circuitry can be programmed to function in two or more dependent modes of operation in which a pair of related signals appear at the first and second pads, respectively, wherein the two or more dependent modes of operation have different combinations of high, low, common mode, and differential voltage levels.

2. (previously presented) The invention of claim 1, wherein:

the programmable device is an FPGA; and

the dependent modes of operation include both signal-driving and signal-receiving modes of operation.

3. (previously presented) The invention of claim 1, wherein, for the first and second pads, the I/O circuitry comprises:

(a) a first programmable impedance switchably connected between the first pad and a first terminal;

(b) a second programmable impedance switchably connected between the first pad and a second terminal;

(c) a third programmable impedance switchably connected between the second pad and a third terminal;

(d) a fourth programmable impedance switchably connected between the second pad and a fourth terminal; and

(e) a fifth programmable impedance switchably connected between the first pad and the second pad.

4. (original) The invention of claim 3, wherein each programmable impedance is a programmable resistor.

5. (original) The invention of claim 3, wherein each programmable impedance is independently programmable.

6. (previously presented) The invention of claim 3, wherein a third pad of the programmable device is switchably connected to a node along the switchable connection between the first and second pads.

7. (previously presented) The invention of claim 6, wherein:

a first part of the fifth programmable impedance is switchably connected between the first pad and the node; and

a second part of the fifth programmable impedance is switchably connected between the second pad and the node.

8. (previously presented) The invention of claim 3, wherein:

the first programmable impedance and the second programmable impedance can be programmably operated as a first push-pull buffer;

the third programmable impedance and the fourth programmable impedance can be programmably operated as a second push-pull buffer;

the first push-pull buffer is implemented as a combination of two or more smaller programmable push-pull buffers; and

the second push-pull buffer is implemented as a combination of two or more smaller programmable push-pull buffers.

9. (canceled)

10. (original) The invention of claim 3, wherein reference voltages or data signals can be independently applied to each terminal.

11. (previously presented) The invention of claim 1, wherein the dependent modes of operation include both differential and complementary modes of operation.

12. (canceled)

13. (previously presented) The invention of claim 1, wherein the dependent modes of operation include both symmetric and non-symmetric modes of operation.

14-17. (canceled)

18. (previously presented) The invention of claim 1, wherein the ependent modes of operation include both differential and complementary modes of operation, both signal-driving and signal-receiving modes of operation, and both symmetric and non-symmetric modes of operation.

19. (previously presented) The invention of claim 1, wherein:

the programmable device is an FPGA;

for the first and second pads, the I/O circuitry comprises:

(a) a first programmable resistor switchably connected between the first pad and a first terminal;

(b) a second programmable resistor switchably connected between the first pad and a second terminal;

(c) a third programmable resistor switchably connected between the second pad and a third terminal;

(d) a fourth programmable resistor switchably connected between the second pad and a fourth terminal; and

(e) a fifth programmable resistor switchably connected between the first pad and the second pad;

each programmable resistor is independently programmable;

a third pad of the programmable device is switchably connected to a node along the switchable connection between the first and second pads;

a first part of the fifth programmable resistor is switchably connected to the node;

a second part of the fifth programmable resistor is switchably connected to the node;

the first programmable resistor and the second programmable resistor can be programmably operated as a first push-pull buffer;

the third programmable resistor and the fourth programmable resistor can be programmably operated as a second push-pull buffer;

the first push-pull buffer is implemented as a combination of two or more smaller programmable push-pull buffers;

the second push-pull buffer is implemented as a combination of two or more smaller programmable push-pull buffers;

reference voltages or data signals can be independently applied to each terminal; and

the dependent modes of operation include both differential and complementary modes of operation, both signal-driving and signal-receiving modes of operation, and both symmetric and non-symmetric modes of operation.

20. (currently amended) A programmable termination circuit integrated within a programmable device and adapted to provide programmable, resistive interconnections between input/output (I/O) pads of the programmable device, the termination circuit comprising:

a plurality of programmable resistors;

a plurality of programmable switches connecting the programmable resistors; and

a plurality of voltage terminals connected to at least some of the programmable resistors and adapted to receive one or more a programmable reference voltages, wherein, for first and second I/O pads, the programmable termination circuit comprises:

(a) a first programmable impedance switchably connected between the first pad and a first terminal;

(b) a second programmable impedance switchably connected between the first pad and a second terminal;

(c) a third programmable impedance switchably connected between the second pad and a third terminal;

(d) a fourth programmable impedance switchably connected between the second pad and a fourth terminal; and

(e) a fifth programmable impedance switchably connected between the first pad and the second pad, wherein a third pad of the programmable device is switchably connected to a node along the switchable connection between the first and second pads.

21-23. (canceled)

24. (currently amended) The invention of claim [[22]] 20, wherein:

the first programmable impedance and the second programmable impedance can be programmably operated as a first push-pull buffer;

the third programmable impedance and the fourth programmable impedance can be programmably operated as a second push-pull buffer;

the first push-pull buffer is implemented as a combination of two or more smaller programmable push-pull buffers; and

the second push-pull buffer is implemented as a combination of two or more smaller programmable push-pull buffers.

25. (previously presented) A programmable device having programmable input/output (I/O) circuitry and programmable logic connected to receive incoming signals from and provide outgoing signals to the I/O circuitry, wherein:

the I/O circuitry can be programmed to function in an independent mode of operation in which first and second pads of the programmable device operate independent of one another; and

the I/O circuitry can be programmed to function in one or more dependent modes of operation in which a pair of related signals appear at the first and second pads, respectively, wherein, for the first and second pads, the I/O circuitry comprises:

(a) a first impedance switchably connected between the first pad and a first terminal;

(b) a second impedance switchably connected between the first pad and a second terminal;

(c) a third impedance switchably connected between the second pad and a third terminal;

(d) a fourth impedance switchably connected between the second pad and a fourth terminal;
(e) a fifth impedance switchably connected between the first pad and the second pad; and
(f) a third pad switchably connected to a node along the switchable connection between the first and second pads.

26. (previously presented) The invention of claim 25, wherein each impedance is a programmable impedance.

27. (previously presented) A programmable device having programmable input/output (I/O) circuitry and programmable logic connected to receive incoming signals from and provide outgoing signals to the I/O circuitry, wherein:
the I/O circuitry can be programmed to function in an independent mode of operation in which first and second pads of the programmable device operate independent of one another; and
the I/O circuitry can be programmed to function in one or more dependent modes of operation in which a pair of related signals appear at the first and second pads, respectively, wherein, for the first and second pads, the I/O circuitry comprises:
(a) a first impedance switchably connected between the first pad and a first terminal;
(b) a second impedance switchably connected between the first pad and a second terminal;
(c) a third impedance switchably connected between the second pad and a third terminal;
(d) a fourth impedance switchably connected between the second pad and a fourth terminal; and
(e) a fifth impedance switchably connected between the first pad and the second pad, wherein:
the first impedance and the second impedance can be operated as a first push-pull buffer;
the third impedance and the fourth impedance can be operated as a second push-pull buffer;
the first push-pull buffer is implemented as a combination of two or more smaller push-pull buffers; and
the second push-pull buffer is implemented as a combination of two or more smaller push-pull buffers.

28. (previously presented) The invention of claim 27, wherein each impedance is a programmable impedance.